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MORSE EXACT FARE TEST

PHASE I REPORT

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Advanced Fare Collection Task Force

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Executive Summary

With the approval of the Chicago Transit Board, but without special funding, the CTA's Advanced Fare Collection Task Force conducted a test of rapid transit exact fare at Morse, North-South Station, beginning August 3, 1986 and ending March 20, 1987. Major support of the Morse Test was provided by Task Force member divisions Engineering and Maintenance; Operations; Finance; and Planning, Marketing, and Development, under their operating budgets.

The purpose of the test was to obtain information and experience from which to develop an exact fare system for the stations of the Southwest Transit Project and prepare specifications for the equipment needed to operate it.

Conclusions

1. CTA rapid transit riders will accept exact fare and adjust to it, provided the most convenient currency units (including dollar bills) can be used for payment.

2. Fare collection equipment currently available is not suitable for application as a rapid transit agent exact fare receiver.

3. Automatic bill-verifying machines currently available off-the-shelf are not configured properly for CTA transit use.

4. The automatic turnstiles now used by the CTA are not reliable enough to be trusted by most riders who could use them.

5. Development and testing of new fare collection equipment and procedures without dedicated funding should be avoided, if possible.

Recommendations

1. Establish a policy of exact fare on the CTA rapid transit as a step in the transition to fully automated fare collection.

2. Fund a project to identify or develop and test exact fare receiving equipment suitable for use by CTA rapid transit agents.

3. Fund a program to convert all CTA rapid transit stations to exact fare.

4. Establish and pursue a policy goal of processing as many rapid transit fare classes as practical, until all station entries are controlled automatically, under station attendent supervision.

Introduction

In May 1985, formation of the Advanced Fare Collection Task Force was authorized by the Executive Director. Its purpose was to establish an interdepartmental committee to provide direction and advancement for the design of fare control facilities and equipment throughout the CTA system. The goals of the Task Force were identified as follows:

1. To review the CTA's existing rapid transit fare control equipment and the advancement possibilities available, for application to the Southwest Transit Project and station rehabilitation projects.

2. To facilitate communication between the departments of the Authority which are involved in the planning, design, and operation of fare collection equipment.

3. To provide a standing committee able to evaluate the effects of proposals, such as a change in fare structure, on the fare collection system, and to provide design solutions to operating problems.

At the first Task Force meeting on May 30, 1985, members were asked to prepare a list of the aspects of the existing fare collection system that their departments wished to be improved, to be submitted for discussion at the next meeting.

The improvements requested by the Task Force included the following:

1. Exact fare - agents not handling fares.

2. More reliable fare class registers, agent-controlled turnstiles, and automatic turnstiles.

3. Increased use of automatic fare collection and fare vending equipment.

4. Electronic security monitoring for passengers and equipment, including CCTV.

5. A maintenance program for fare collection and fare vending equipment, generating systematic equipment maintenance and life cycle data.

6. Improved communications, to accommodate transmission of revenue and traffic data and voice and video signals.

The Morse Exact Fare Test was undertaken by the Advanced Fare Collection Task Force as a first step toward a new rapid transit

station operating concept. It was prompted by a multiplicity of problems experienced by the Operations and Finance Departments responsible for collecting, accounting for, and handling rapid transit fare revenues under the present system. A description of the present fare collection system and a discussion of its problem areas is included as Appendix 'B'.

The urgency for the Morse Test arose from the planning and design of an all-new rapid transit line, under the Southwest Transit Project, the equipment for which must include provisions for accepting fares and controlling passenger access. Given the choice between attempting to evolve the system so as to eliminate or minimize the problems of the present system, or to have those operating problems perpetuated and extended, the Task Force chose to pursue improvement.

Because a consultant study to identify fare systems suitable for the CTA among the many fare structure and technology options now available is still in progress, the details of the next operating system that will be chosen are far from certain. Nevertheless, the Task Force believes that some general aspects can be presumed and acted upon.

In the goal concept for fare collection developed by the Task Force, each station fare-collection area would be supervised by an attendant. The duties of such an attendant would include the following:

1. Overseeing the operation of automatic fare collection and fare vending equipment.

2. Providing travel information and other assistance to passengers.

3. Identifying and reporting maintenance defects of all kinds.

4. Maintaining security surveillance.

5. Performing light housekeeping tasks.

6. Issuing emergency transfers (or future equivalent).

Entering passengers would admit themselves through electronically-controlled turnstiles or other faregate devices able to process all fare media in use, such as coins, tokens, transfers, passes, farecards, and reduced fare identification cards. Attendants would not make change or handle money for the payment of individual fares, but might vend prepaid fare media.

The Task Force recognized that though a distance-based fare system would be required to achieve a policy goal of relating fares to the cost and value of CTA transit services, such a system could not be put into place quickly, even if one had been selected and developed. In addition to the limited funding that will be available each year for new fare control equipment, the

lack of space to accommodate the equipment of a distance-based fare system in many stations would probably require ten or more years to correct. Under these conditions, the evolution of the rapid transit fare collection system will have to proceed by increments.

Short-range goals suggested by the Director, Rail Personnel, for the test installation, and the means to pursue them considered by the Task Force, were as follows:

Goal 1. Develop methods to ensure that all rapid transit fares due are received and retained.

Means: Provide reliable agent's fare register and display equipment to maximize correct fare class registration for each passenger entry.

Provide equipment that enables secure acceptance, storage, and removal of agent-processed revenues.

Provide equipment that automatically counts fare revenues and keeps running totals of each agent's revenue stream.

Goal 2. Reduce the responsibility of agents to process fare transactions.

Means: Eliminate the handling of money by agents by requiring exact fare, and providing secure money receiving and storage equipment.

Encourage increased utilization of prepaid fare media, i.e., passes and tokens, by increasing discount purchase savings.

Encourage increased use of automatic turnstiles for entry by improving turnstile reliability and providing token vending machines and turnstile-acceptable passes.

Development of the Test

In order to develop an exact fare system for the stations of the Southwest Transit Project, and prepare specifications for the equipment needed for it, the Task Force decided that an exact-fare station installation should be tested. This would enable the riding public's response to the "no-change" situation to be observed, and would provide first-hand experience in operating a station on an exact-fare basis.

Site Selection

The following criteria were used in the selection of a test station:

1. Entering traffic above system average.

2. Continuous agent coverage.

3. Approximately even distribution of cash fares and transfers/passes.

4. Station at ground level.

The Task Force's initial choice was Loyola/N-S, which served 6,450 entering passengers per weekday in 1985, distributed 39% full cash, 4% reduced cash, 19% transfers, and 38% passes. However, it was soon recognized that installing exact-fare equipment in the new stainless steel clad booth would be unduly destructive to the booth, as well as expensive, and that there is insufficient available space in which a suitably located temporary exact-fare agent enclosure could be erected.

Morse/N-S was then considered. In 1985, Morse weekday entering traffic was distributed 44% full cash, 7% reduced cash, 13% transfers, and 36% passes. It was noted that though total entering passengers per weekday at Morse were 1,200 fewer than at Loyola, those paying cash were only 150 fewer per day. The old, wood agent booth at the Morse entrance was felt to be easily alterable to install exact fare equipment. The station room, though awkwardly arranged, was judged roomy enough to accommodate additional equipment, if needed.

The Task Force also felt that the morning rush-hour-only secondary entrance from Lunt Avenue, where the agent could continue to make change, would afford a reasonably convenient alternative for rush-hour passengers unable to muster exact fare to enter at Morse Avenue.

It was therefore decided to conduct a test of the exact fare concept at Morse.

Equipment Selection

To assure that information from the test would become available in time to be used in developing the Southwest fare collection system, it was decided to divide the test into phases so it could be started as soon as possible. The first phase of the test was planned to adopt bus fareboxes for use as the agents' exact fare receivers, since units were available. More satisfactory exact-fare equipment would then be introduced in succeeding phases, as it was developed or became available, with the original boxes retained as backup equipment.

The Task Force agreed that exact fare at rail stations should be experienced by riders the same as on the buses. It was initially proposed to use the new bill-accepting, electronic GFI bus farebox as the agent's exact fare receiver in the test, registering fares either by remoting the farebox keypad to the agent's countertop, or by interfacing the farebox with a visifare register console. When use of the GFI farebox was pursued, however, three major obstacles were encountered, as follows:

1. Daily revenues received at the #1 agent position at Morse far exceeded the cash storage of the farebox. Weekday revenues were usually above $1,500 per day, and occasionally exceeded $2,000. Though the coin/token section of the GFI farebox vault can hold $800-$1,000 in mixed coins and tokens, the paper money section (which relies solely on the jouncing motion of a bus to compact bills) can hold only about 500 of them without jamming. Since many rapid transit full fares were being paid with bills, the #1 agent's farebox would have to be collected at least three times per weekday, and twice each per Saturday and Sunday. To reduce collections to one per day would require modification to substantially increase bill storage capacity, even if revenues were more evenly distributed between the #1 and #2 agent positions.

2. The configuration of functional elements in the GFI farebox is unsuitable for agent use, as follows:

   a. Two windows at the rear of the farebox enable the bus operator to view the items of currency deposited for each cash fare, together with a digital display of the amount counted by the farebox. The windows extend more than 12 inches below the top of the farebox, where the coin drop and bill-receiving slots are located. Mounting a GFI farebox high enough that an agent's view of the windows would not be obstructed by the agent's counter (top 44-1/2" to 45" above the station floor) would place the money slots too high for short patrons to see them.

   b. In case of a fare payment dispute, a bus passenger can move to the back of the farebox and view the money deposited and the total display. A passenger outside an agent booth would not be able to see the back of a farebox mounted on, or within, the booth wall.

3. Modifying a new farebox prior to the expiration of its manufacturer's warranty period would void the warranty for that unit, and would probably exempt the unit from the contract with outside forces for maintaining all the GFI fareboxes. If the CTA became obliged to maintain the modified GFI units in-house, a parts inventory would have to be established and repairmen trained. Moreover, if a modified farebox could not be restored to its original condition after the test was completed, UMTA (Urban Mass Transit Administration), which funded the purchase and installation of the GFI fareboxes, would expect to be reimbursed for the loss of service life of the box.

It was therefore decided to pursue adapting units of the simpler non-registering, non-counting Duncan farebox, that had been replaced by the GFI design boxes, as the agent's receiving equipment for the first phase of the exact fare test. The advantages of using them were as follows:

1. Many of the Duncan units were still on hand and available.

2. CTA forces had maintained the Duncan units, and were intimately familiar with them. Replacement parts were on hand.

3. The units are simple and reliable. Two areas of vulnerability to forced entry were felt to be correctable.

4. The design of the Duncan farebox, which has a glass enclosure over the inspection plate, is similar to that of an earlier bus farebox that was successfully adapted for rapid transit use in the late 1970's, as a means of deterring agent holdups. The farebox could be installed so that both riders and agents would be able to view money on the inspection plate.

5. The cashboxes of the Duncan units are the same as those of the automatic turnstiles in use, and could be collected by the personnel who collect turnstile revenues, without additional equipment.

The disadvantages of using modified Duncan fareboxes for the test were identified as follows:

1. The boxes do not accept dollar (or larger) bills, which would probably be the medium of choice for most full fare-paying riders, and some riders of other fare classes, to use for payment. Cash riders would have to be trained to arrive with correct change or tokens, or to use a pass.

2. The cashbox capacity is about $800 in mixed coins and tokens. Means of minimizing the number of daily cashbox pickups required would have to be employed. Scheduling the agent work positions so as to equalize the distribution of revenue between them, and encouraging full cash riders to purchase tokens and to use the automatic turnstiles for entry were suggested.

3. The fareboxes do not count money deposited, but only accept and store it securely. Though not essential for a one-station test, the capability to precisely quantify the amount of money in a cashbox when removed would provide an important safeguard against theft by money-handling employees.

Equipment Development

The Facilities Maintenance Department began developing the Phase I exact fare equipment in November 1985. A full-size mockup of the west-facing agent position in the Morse booth was built, to aid in working out how the agent's farebox should be installed. (Later, the mockup became part of the fare collection assembly used for training agents.) Modifications to the farebox and booth were then developed, including provisions for depositing coins

and tokens onto the inspection plate; dropping the inspection plate electrically when a cash fare was registered on the agent's visifare console; and removing the cashbox vault from outside the booth for collection.

As the agents' fareboxes for the Morse Test were being prepared, an important operating factor for stations was altered. On February 9, 1986, the CTA fare structure was changed, including a 10¢ increase in rapid transit fares and increased charges for transfer tickets. Full fare for the rapid transit became $1.00 without transfer and $1.25 with, and passengers with a transfer issued on a bus were required to pay the 10¢ bus-rail fare differential to enter a station. The costs full and reduced fare monthly passes were increased, and bi-weekly passes were introduced. At the same time, new transfer regulations were put into effect, and a corresponding new format for transfer tickets was introduced. For the two weeks after the fare change, cash revenues received by the Morse agents were about 27% higher on weekdays than they had been the two weeks before, which rendered the capacity limitation of the Phase I fareboxes still more critical.

The higher fares not only enlarged the volume of cash received at stations, but increased the convenience of dollar bills for paying full cash fares. The Task Force recognized that special efforts would be needed to mitigate the inability of the Phase I exact fare equipment to accept dollar bills, and planned to promote greater use of automatic turnstiles and maximum use of tokens and passes, so as to reduce the volume of coins received in the Morse fareboxes and minimize its weight. Arrangements were made to install an automatic bill changing machine, at Morse in advance of the test. It was set up to vend tokens, to stimulate token use.

No modifications to the automatic turnstiles at Morse were needed for the Test. However, to enhance reliability of the units during testing, Facilities Maintenance pledged to give them extra attention.

Employee Instruction and Training

A prototype agent's exact fare installation, assembled from the first modified Duncan farebox, a visifare register console, and the mockup of the Morse booth, was provided to the Operations Division for developing operating procedures and training agents. A bulletin describing how Morse agents were to operate during the Test was prepared and issued by Operations. Most of the agents who could be assigned to work at Morse received familiarization training on the mockup prior to the Test. Those who did not were trained after testing had started, some on the mockup and some at Morse.

Public Relations

The first public announcement of the Test appeared in news media

accounts of the July 2, 1986 meeting of the Chicago Transit Board. In mid-July, copies of a standard letter announcing the Test were sent to all known neighborhood organizations in the Morse Station area, accompanied by copies of a leaflet about it. Press releases giving information about the Test were provided to citywide and neighborhood newspapers.

During the week before the Test began, signs promoting it were installed in the Morse Station. Beginning at that time, and during the Test, copies of the leaflet, which contained an entry blank for a monthly drawing for free passes, were distributed to riders at Morse. Beginning in September 1986, CTA Public Affairs conducted drawings for the passes monthly throughout the Test. When the exact-fare equipment for Morse agents was installed on August 2 and 3, 1986, temporary information graphics were posted. They warned entering patrons of the exact fare requirement and identified where the farebox payment slots were located. In October 1986, when rearrangements of the station equipment had been completed, an entire new station graphics system was installed. In addition to coordinated passenger direction signage, a sign giving general information about the Test and the name and address of a person to whom written comments should be sent was posted.

Data Collection

Since complete records of agent fare class registrations and revenue are maintained in a Finance Department computer data bank, it was decided to take agent data for the Test from it, to save staff time. To provide daily turnstile traffic data, Finance agreed to collect revenue and record traffic data from the turnstiles at Morse each weekday, instead of three times per week (Monday, Wednesday, and Friday), beginning one week before the Test. Later, it was decided to also take weekend turnstile readings directly, rather than estimating Saturday and Sunday traffic and revenue from each Monday's combined totals.

Start-Up Period

Phase I of the Exact Fare Test was begun on Sunday, August 3, 1986. During the first two weeks of the test, start-up support personnel were present each day, particularly during morning rush hours. They included supervisors, instructors, and change-making conductors from the Operations Division; information representatives from Public Affairs and Operations Planning; and observers from Operations, Finance, and Operations Planning.

After the second week, supporting personnel were present at Morse intermittently. Following the installation of a second machine to vend tokens from $1 and $5 bills, a manual change maker was assigned only when the bill-accepting machines went out of service. (A dollar bill changing machine was also purchased and installed.) Observation was reduced to monitoring weekday rush hours, which continued throughout Phase I.

Problems developed immediately, both from the public and from the equipment. Many passengers did not come prepared with exact change. Some were not aware of the new requirement, being infrequent transit users or having language difficulties. Many riders tried to pay with dollar bills, despite the posted warnings that they would not be accepted. Long lines often formed when rush-hour buses dropped loads of transferring passengers. Problems were experienced with all the equipment, as follows:

Agent's fareboxes

1. The chutes directing cash onto the farebox inspection plates were found too narrow for some riders to reach into to retrieve a mistakenly inserted bill or overpayment. Larger chutes were installed.

2. The springs holding the inspection plates level were too weak to support the change for a Sunday Supertransfer fare, and were strengthened.

3. Cashbox capacity was found insufficient to allow only one cash pickup per day. A second daily cash pickup was scheduled, incurring costs for a security guard and overtime work by two Finance employees.

Token Vending and Change Machines

1. The token vending machine installed at Morse prior to the test to promote token use was perceived by many riders as a convenient means of avoiding the need to arrive with exact change. Almost immediately, passenger demand for single token purchases from the machine created backups. The Task Force's preference was to "tough it out" at least for the first three or four weeks, and perhaps to remove the machine to emphasize the need for riders to come to the station with correct change. However, at the direction of a CTA Board Member, a second token vendor was installed. This increased the cost of token vendor maintenance and appears to have locked in rider dependence on the machines for changing $1.00 bills.

2. Change for the $5 bill transaction did not include a dime for the rapid transit fare differential. The token vendors were reprogrammed to provide dimes.

3. No change was available for reduced fares. A dollar bill changer was also added, at Board Member insistence.

4. The bill-accepting machines frequently ceased working, due to jamming by torn bills or dirty sensing elements. Two men were needed to clear jams and service the machines in order to assure the security of monies stored in the machines. Unscheduled trouble calls required compensation at overtime rates. Regular cleanings were eventually done in

conjunction with inventorying of the machines, which substantially improved their reliability.

Automatic Turnstiles

1. The turnstile coin mechanism, though very fast, was found vulnerable to dirt and abuse. Numerous miscounting malfunctions were experienced, requiring a turnstile to be closed until the coinmech could be cleaned and readjusted. Common miscounts were in crediting value for a non-monetary object and not crediting proper value for a token. Reliability of the Morse turnstiles was improved by intensifying maintenance efforts.

2. The transfer printer malfunctioned far too frequently for the small volume of transfer receipts issued each day. Particularly annoying were automatic shutdowns of the printer that occurred when money had been deposited with the transfer available indication showing. This fault required careful maintenance attention to correct.

Impact of the Test Conditions

Rider Response

The most dramatic change in rider behavior in response to the exact fare conditions of the Test was an immediate ten-fold increase in automatic turnstile use, as shown in Appendix 'A', Table I. Turnstile entries increased from an average of 431 per week during the two weeks before the Test to an average of 4,510 entries per week during the first two weeks of the Test. Nevertheless, of those passengers who could have used the automatic turnstiles for entry, fewer than half did so, even though the Morse turnstiles were given extra attention during the Test, to make them as reliable as possible. Rather than continuing to increase as the Test progressed, as had been hoped would occur, use of the automatic turnstiles remained essentially constant until the QuikPass magnetically-coded pass test was superimposed on Morse on March 1, 1987.

Over the 30 weeks of the Test up to March 1, 1987, entries by turnstile averaged 4,481 per week (all cash/token). During the last three weeks of the Test, which were overlapped by the QuikPass Test, Morse turnstile entries averaged 5,437 per week, of which 4,082 were cash/token entries and 1,355 were with QuikPass. This suggests that about 80 weekday passengers who had previously used the turnstiles on a cash/token basis switched to the QuikPass as soon as it became available.

Tables II and III in Appendix 'A' show that use of monthly and bi-weekly passes at Morse also changed very little during the first 30 weeks of the Test, except for a seasonal increase beginning in September 1986, which occurred at both Morse and Lunt. Notably increased pass use was recorded in March 1987, when the test of magnetically-coded passes began. In the first week of March 1987, pass usage was more

than 1,000 entries greater than it had been for the last week of February 1987. Further increases occurred in succeeding weeks, though not uniformly, and can be attributed to increasing public awareness of the QuikPass option.

Some rush-hour passengers who used the Morse entrance before the Test were expected to switch to Lunt, so as to bypass the exact fare requirement. Though some are believed to have done so at least occasionally, their numbers were so few as to be completely masked by the daily and weekly variability of passenger traffic entering through Morse and Lunt. About ten per weekday are estimated to have diverted to Lunt. Some diversion of passengers to Loyola and to bus service was also expected, particularly on weekends. Again, such movements were too small to be evident, if they occurred.

Perhaps the greatest disappointment to the Task Force was the reluctance of most full-fare Morse riders to purchase tokens in advance. Their propensity for arriving day after day with dollar bills caused a continued high level of stress on the bill-accepting change and token vending machines, frequent formation of lines at those machines during the morning rush hour and other busy times, and contributed to the agent farebox capacity problem.

By the time virtually all Morse riders appeared to be familiar with the exact fare arrangement under test, a considerable period had elapsed, nearly six months. Three conditions seem to have prevented a stable operation from being established much sooner, as follows:

1. The inability of the on-line equipment, i.e., agents' fareboxes and automatic turnstiles, to accept dollar bills, even though the Rapid Transit regular fare had become $1.00. This was by far the hardest feature for passengers to become reconciled to, and some never did. Most full-fare riders clearly felt that the 5¢ per ride discount given with tokens purchased in groups of five or ten was outweighed by the convenience of carrying only dollar bills.

2. The community served by Morse includes many residents who use transit service only occasionally, as well as a continuing inflow of new residents, which extended the period needed for complete exposure of the community to the Test.

3. A diversity of native languages other than English in the community reduced the effectiveness of media coverage of the Test, and of the informational material provided to passengers. Based on observation of the Test and on the entries submitted for the monthly drawings for free passes, non-English-speaking ethnic

minorities in the community include Hispanics, Indians, Russians, Pakistanis, and Koreans.

CTA Response

Agents

Agent reactions tended to be favorable, though not all were. Most of those who worked at Morse during the Test were gratified to be relieved of responsibility for keeping fare revenues secure and accounting for every penny. Some of the Morse agents suggested other stations where they would like to see an exact-fare system installed. Most frequently nominated was Chicago/State, N-S, where it is not uncommon for two weekday agent tricks to turn in revenues exceeding $1,500, and occasionally three do. Several regarded working at Morse under exact fare as a preferable assignment.

A few agents did not favor the exact fare system. They reported being bothered by the frequency of complaints about malfunctioning equipment, mostly the bill-accepting units, and about the exact-fare requirement and the nonacceptance of dollar bills. Some were also disturbed by a perceived change in rider attitude toward themselves, from friendliness to animosity, because of the Test conditions.

Test Cost

Operating costs for the Test were high, due to the need for a second cash pickup each weekday and for weekend cash pickups, for which overtime rates had to be paid. Emergency service calls for the bill-accepting machines, requiring two men to respond, were also on overtime, as were manual change makers provided by Operations when bill-acceptors were not working.

Despite the diversion of passengers from agents to the automatic turnstiles, their numbers did not become sufficient to enable elimination of the second rush-hour agent trick, which had been added after the last fare change.

Conclusions

1. Rapid transit riders will accept exact fare and adjust to it, provided the most convenient currency units can be used for payment.

   Despite the limitations of the equipment for accepting exact fares that was available for use in the test at Morse, most riders soon became accustomed to arriving with exact fare. What they objected to was not being allowed to use $1.00 bills directly at the point of entry because the agent fareboxes could not accept bills. This problem would be eased temporarily if the $1.00 bill were supplanted by a new $1.00 coin, but

would recur when fares inflated to the value of the next U.S. currency bill.

2. Fare collection equipment currently available is not suitable for application as a rapid transit agent exact fare receiver.

   The CTA's bill-accepting bus fareboxes, typical of farebox technology currently available, are not configured for an agent's use, do not verify bills automatically, and have far too little cash capacity to accommodate daily agent revenues at most CTA stations. The need to empty the Morse agent fareboxes twice per weekday was responsible for the largest share of extra operating costs incurred in the test. Appropriate technologies have yet to be combined into a unit that meets the requirements of an agent's exact fare receiver, which is needed for Phase II testing.

   The CTA will soon have on hand part of the technology needed for an adequate agent's exact fare receiver. Six units of an electronic programmable agent's register, recently developed by a local fare collection equipment supplier, are included in the new State of Illinois Center Station, which is nearing completion. They utilize the same microprocessor as is used in the CTA's current bus fareboxes, which provides the same capability to transmit traffic and revenue data directly into the Finance Department's data bank.

   These units can be programmed to register fares in twice as many fare classes as the larger type of present electromechanical Visifare registers, and are equipped with alphanumeric information displays for both agent and passenger. The new register's data port will also enable a unit to be integrated with a suitable device for automatically verifying and storing coins and currency bills, when one becomes available, to comprise an agent's receiver with all the features needed for rapid transit exact fare.

3. Automatic bill-verifying machines currently available off-the-shelf are not properly configured for CTA transit use.

   The token vending machines and the $1.00 bill changer tested at Morse demonstrated the availability of adequately discriminating bill verification, but were found subject to disablement by jamming of the bill transport mechanism with folded and torn bills. Though most such jams were easily clearable, the design of the machines is not compatible with ready access by agents or agent supervisors for timely restoration to service when one is jammed. Frequent service calls for the bill-accepting machines produced the second largest

portion of extra operating costs incurred during the Test.

The Fare Collection Development Group of the CTA Treasury Department has recently developed specifications for bill-accepting change/token vending machines suitable for transit use. It is hoped that one or more manufacturers will be willing to produce units that meet them.

4. The automatic turnstiles now used by the CTA are not reliable enough to be trusted by most of the riders who could use them for entry to stations.

   Though full-fare passengers at Morse were strongly encouraged to use the turnstiles for entry, only about 25% of full cash revenue was collected by the turnstiles. Riders are believed to avoid using the present turnstiles because all coins inserted are retained by the machines, whether counted correctly or not, and miscounts are felt to occur too frequently.

   The deficiencies of the present turnstiles have been addressed in the design of a new type of automatic turnstile, 15 units of which have been provided in the new State of Illinois Center Station. They incorporate a coin acceptor believed to be fast and accurate, an escrow with coin return capability, an alphanumeric display for use instructions and machine status, automatic data transfer capability, and greatly improved money security. Because the station has not been completed, these turnstiles have yet to be turned over to the CTA and placed in service, so their performance is still to be ascertained.

5. Development and testing of new fare collection equipment and procedures without dedicated funding should be avoided, if possible.

   Though approval to conduct the Morse Test was obtained from the Board, no funding was provided because the Test was to be supported by the operating budgets of participating departments. This arrangement may have minimized the possibility that the Board would not agree to the Test, but it also meant that correction of problems with the test installation could not assume any special priority over routine maintenance work. Dedicated funding could have relieved the Finance Department of the burden of overtime costs for extra cash pickups from the Morse agent fareboxes and made personnel available to concentrate on solving problems and developing equipment for the second phase of the Text.

Recommendations

1. Establish a policy of exact fare on the CTA rapid transit as a step in the transition to fully automated fare collection.

   Exact fare for the rapid transit has the potential to hold revenue losses from robbery and employee theft to a very low minimum, while affording savings in the personnel needed to handle, transfer, and account for fares, and to resolve disputes over accounting discrepancies. It would increase the attractiveness to riders of using prepaid fare media (such as passes, tokens, and tickets), which can be processed automatically for faster, more convenient passenger entry and at low unit cost to the CTA. With automatic data transfer from stations to a central computer, station revenue and traffic data could be completed more accurately and made available for review and use much more quickly and cheaply than is possible under the present system.

2. Fund a project to identfy or develop and test exact fare receiving equipment suitable for use by CTA rapid transit fare agents.

   Provided that the new generation agent registers and automatic turnstiles being introduced at the State of Illinois Center Station can be made to perform in service as expected, and that the CTA's pass reader system will be made permanent and expanded, the only new equipment needed to complete a basic exact fare system for rapid transit stations is a suitable agent's money receiver.

   Such a unit must combine the following capabilties:

   a. Automatically verify U.S. currency bills up to $20.00, in addition to U.S. coins and CTA tokens, and totalize their value.

   b. Provide sufficient secure revenue storage capacity to contain all cash and token fares received at any particular agent position in a 24-hour period.

   c. Operate with high reliability.

3. Fund a program to convert all CTA rapid transit stations to exact fare.

In addition to covering the costs of purchasing and installing exact fare station equipment, dedicated funding is needed to assure adequate staff support for the conversion program. Essential staff tasks will include the following:

- Develop recommended priorities for conversion.
- Prepare an implementation plan and obtain Board approval to proceed.
- Prepare installation designs and staging plans.
- Order equipment and materials.
- Schedule installation.
- Prepare public notification and instruction materials.
- Develop employee materials.

4. Establish and pursue a policy goal of processing automatically as many rapid transit fare classes as practical, until all station entries are controlled automatically, under station attendent supervision.

Each incremental advance toward full automation of station access control benefits both the riding public and the CTA. Automating the processing of a fare class provides better service to passengers of that class by enabling them to enter the sustem quickly at any time, and to passengers whose fare class cannot yet be processed automatically, by removing others from the agent lines. With increased automation of fare processing, the CTA can offer a higher level of service and obtain more secure revenue handling, more timely and more accurate traffic and revenue data, and reduced requirements for manpower to accept fares, handle and account for revenues, and process data.

Though there is presently available no automatic fare collection system that can fully accommodate the requirements of the CTA's fare structure, there are available technologies that can be used to reliably process several fare classes. For example, the CTA could adapt presently available magnetic and coin-accepting technologies to accept reduced cash fares as well as full cash, and to validate reduced as well as full fare monthly passes and employee passes, on buses and in rapid transit stations. By exploiting new fare collection technologies as they become available, the CTA would be able to reap the short term benefits of low-grade automation while preparing the system and the riding public for more sophisticated fare control systems, such as those using stored value tickets.

TABLE I

Morse Turnstile Traffic

.DATE 10 NOV 87 16:14:59 RID 74I 10 NOV 87 DALEY
.@880131 MORSE EXACT FARE TEST,MORSE TURNSTILE TRAFFIC BY:

*SRCE.	WEEK .		.REG	.WEEK.	AGENT.	FULL.	FULL.	REDU.	REDU.	M/BW.	EMP/.	BTFR.	RTTR.	STFR.	REDU.	UNIT.	COMP.	. CASH .	
*REPT.	ENDED	.DAY.	WIN.	TRIK.	INDX.	TAG .	FARE.	W/TR.	FARE.	W/TR.	PASS.	PRMT.	RCVD.	RCVD.	FARE.	STFR.	TRAFK.	SUBTL.	.COLLECTD.	COMMENTS
FREV	860713	SUN		AET	-4	(EST)	200	22			0						222	232.50	PRE-TEST
FREV	860720	SUN		AET	-3	(EST)	208	20			0						228	233.00	PRE-TEST
FREV	860727	SUN		AET	-2	(EST)	410	52			0						462	475.00	PRE-TEST
FREV	860803	SUN		AET	-1	(EST)	344	56			0						400	414.00	TRANSITION
FREV	860810	SUN		AET	1	(EST)	3563	732			0						4295	4478.50	TEST
FREV	860817	SUN		AET	2	(EST)	3950	774			0						4724	4917.50	TEST
FREV	860824	SUN		AET	3	(EST)	4269	893			0						5162	5385.25	TEST
FREV	860831	SUN		AET	4	(EST)	4019	945			0						4964	5200.25	TEST
FREV	860907	SUN		AET	5	(EST)	3577	727			0						4304	4485.75	TEST
FREV	860914	SUN		AET	6	(EST)	3530	758			0						4318	4477.50	TEST
MDOP	860921	SUN		AET	7		3285	745			0						3968	4216.25	TEST
MDOP	860928	SUN		AET	8		3648	753			0						4401	4589.25	TEST
MDOP	861005	SUN		AET	9		4192	711			0						4903	5080.75	TEST
MDOP	861012	SUN		AET	10		4071	732			0						4803	4985.00	TEST
MDOP	861019	SUN		AET	11		3712	630			0						4342	4499.50	TEST
MDOP	861026	SUN		AET	12		3451	654			0						4105	4268.50	TEST
MDOP	861102	SUN		AET	13		4321	680			0						5001	5171.00	TEST
MDOP	861109	SUN		AET	14		4285	641			0						4926	5086.25	TEST
MDOP	861116	SUN		AET	15		3926	632			0						4558	4716.00	TEST
MDOP	861123	SUN		AET	16		3858	592			0						4450	4598.00	TEST
MDOP	861130	SUN		AET	17		2724	533			0						3257	3390.25	TEST
MDOP	861207	SUN		AET	18		4285	612			0						4897	5050.00	TEST
MDOP	861214	SUN		AET	19		3732	589			0						4321	4468.25	TEST
MDOP	861221	SUN		AET	20		4231	561			0						4792	4932.25	TEST
MDOP	861228	SUN		AET	21		3254	636			0						3890	4049.00	TEST
MDOP	870104	SUN		AET	22		2930	556			0						3486	3625.00	TEST
MDOP	870111	SUN		AET	23		4484	671			0						5155	5322.75	TEST
MDOP	870118	SUN		AET	24		3777	500			0						4277	4402.00	TEST
MDOP	870125	SUN		AET	25		3805	563			0						4368	4508.75	TEST
MDOP	870201	SUN		AET	26		4550	519			0						5069	5198.75	TEST
MDOP	870208	SUN		AET	27		4417	539			0						4956	5090.75	TEST
MDOP	870215	SUN		AET	28		4233	558			3						4794	4933.50	TEST
MDOP	870222	SUN		AET	29		3640	368			23						4031	4123.00	TEST
MDOP	870301	SUN		AET	30		3591	359			0						3950	4039.25	TEST
MDOP	870308	SUN		AET	31		4216	480			1486						6182	4816.00	TEST
MDOP	870315	SUN		AET	32		3573	370			1291						5234	4035.50	TEST
MDOP	870322	SUN		AET	33		3336	273			1287						4896	3677.25	POST-TEST
MDOP	870329	SUN		AET	34		1813	268			1330						3411	2148.00	POST-TEST
MDOP	870405	SUN		AET	35		1510	176			1588						3274	1728.90	POST-TEST
MDOP	870412	SUN		AET	36		1745	203			1778						3726	1991.50	POST-TEST
MDOP	870419	SUN		AET	37		1303	127			1568						2998	1461.75	POST-TEST
MDOP	870426	SUN		AET	38		1690	193			1634						3467	1931.25	POST-TEST
MDOP	870503	SUN		AET	39		1522	157			1657						3336	1728.25	POST-TEST

..... END REPORT .....

TABLE II

Appendix 'A'

Morse Agent and Turnstile Traffic

.DATE 11 NOV 87 09:29:04 RID 69I 11 NOV 87 DALEY
.8880131 MORSE EXACT FARE TEST,MORSE AGENT AND TURNSTILE TRAFFIC BY:

SRCE. REPT.	WEEK ENDED	DAY.	WIN.	REG TRIK.	WEEK INDX.	AGENT. TAG	FULL. FARE	FULL. W/TR	REDU. FARE	REDU. W/TR	M/BW. PASS.	EMP/. PRMT.	BTFR. RCVD.	RTTR. RCVD.	STFR. FARE	REDU. STFR.	TURN. SUBTL.	COMP. SUBTL.	CASH COLLECTD.	COMMENTS
FREV	860713	SUN		AET	-4	(EST)	8669	4141	523	417	11856	448	1917	1011	592	71	222	29645	15253.95	PRE-TEST
FREV	860720	SUN		AET	-3	(EST)	9234	4414	591	422	12115	469	1735	822	509	48	228	30359	15880.40	PRE-TEST
FREV	860727	SUN		AET	-2	(EST)	9545	4296	694	412	11678	510	1951	953	557	49	462	30645	16163.85	PRE-TEST
FREV	860803	SUN		AET	-1	(EST)	8365	3822	505	371	10410	562	1677	860	383	40	400	26995	13840.75	TRANSITION
FREV	860810	SUN		AET	1	(EST)	10164	3933	584	537	11173	1057	1742	870	472	49	4295	30581	15293.30	TEST
FREV	860817	SUN		AET	2	(EST)	9853	4192	529	392	11356	898	1655	892	421	47	4724	30674	16089.25	TEST
FREV	860824	SUN		AET	3	(EST)	9792	4150	491	294	11399	813	1617	851	389	39	5162	29835	15794.50	TEST
FREV	860831	SUN		AET	4	(EST)	9390	4332	415	299	10881	712	1631	821	459	235	4964	29175	15714.35	TEST
FREV	860907	SUN		AET	5	(EST)	8693	4052	522	405	10857	596	1434	1270	710	80	4304	28619	15306.70	TEST
FREV	860914	SUN		AET	6	(EST)	9043	4187	755	651	12263	669	1694	869	410	47	4318	30588	15736.25	TEST
MDOP	860921	SUN		AET	7		8168	4027	777	651	12238	605	1670	875	361	25	3968	29397	14614.95	TEST
MDOP	860928	SUN		AET	8		8854	4123	781	657	12150	693	1709	780	331	32	4401	30110	15266.10	TEST
MDOP	861005	SUN		AET	9		9427	3962	764	713	12515	628	1682	832	394	31	4903	30948	15939.80	TEST
MDOP	861012	SUN		AET	10		8961	4114	853	698	13243	628	1621	771	343	33	4803	31265	15468.60	TEST
MDOP	861019	SUN		AET	11		8713	3784	722	592	13043	600	1504	748	407	42	4342	30155	14946.25	TEST
MDOP	861026	SUN		AET	12		8402	3892	821	661	12667	571	1514	824	398	42	4105	29792	14231.10	TEST
MDOP	861102	SUN		AET	13		9572	4170	821	663	12949	580	1630	898	409	35	5001	31727	16145.55	TEST
MDOP	861109	SUN		AET	14		9342	4049	827	634	12741	599	1611	768	354	32	4926	30957	15782.50	TEST
MDOP	861116	SUN		AET	15		8591	3873	702	592	12939	581	1518	774	409	30	4558	30009	14923.50	TEST
MDOP	861123	SUN		AET	16		8746	3862	817	670	13381	762	1615	752	350	37	4450	30992	14979.50	TEST
MDOP	861130	SUN		AET	17		7587	3526	570	486	11118	494	1289	951	698	61	3257	26780	13856.60	TEST
MDOP	861207	SUN		AET	18		9719	4202	781	716	11828	676	1822	678	340	32	4897	30794	16409.85	TEST
MDOP	861214	SUN		AET	19		8778	4025	747	665	12500	647	1625	787	377	35	4321	30186	15303.95	TEST
MDOP	861221	SUN		AET	20		9397	4123	819	750	12294	634	1669	496	415	36	4792	30633	16178.15	TEST
MDOP	861228	SUN		AET	21		7389	3567	345	259	9259	518	1101	942	608	51	3890	24039	13209.75	TEST
MDOP	870104	SUN		AET	22		7431	3574	304	272	9045	543	1142	1308	507	47	3486	23750	11342.50	TEST
MDOP	870111	SUN		AET	23		9365	4327	714	729	11600	631	1674	652	364	36	5155	30092	16149.65	TEST
MDOP	870118	SUN		AET	24		9550	4224	774	657	12436	576	1756	792	345	23	4277	31133	16223.35	TEST
MDOP	870125	SUN		AET	25		8846	3832	657	529	11728	551	1538	863	310	27	4368	28881	15346.95	TEST
MDOP	870201	SUN		AET	26		9647	4044	787	572	12487	623	1666	811	337	32	5067	31006	15789.85	TEST
MDOP	870208	SUN		AET	27		9309	4061	774	677	12279	619	1712	697	362	28	4956	30518	15614.40	TEST
MDOP	870215	SUN		AET	28		9213	3997	714	637	12574	580	1623	797	319	25	4794	30479	15483.75	TEST
MDOP	870222	SUN		AET	29		8787	3771	642	556	12596	608	1544	830	366	37	4031	29737	14832.95	TEST
MDOP	870301	SUN		AET	30		8323	3803	687	674	12609	576	1697	842	340	27	3950	29578	14240.95	TEST
MDOP	870308	SUN		AET	31		9297	4072	727	613	13147	711	1738	968	385	46	6182	31704	15906.70	TEST
MDOP	870315	SUN		AET	32		8197	3601	702	540	12675	679	1592	756	338	33	5234	29113	14026.15	TEST
MDOP	870322	SUN		AET	33		8309	3641	669	584	13035	686	1452	845	409	38	4896	29668	14137.90	POST-TEST
MDOP	870329	SUN		AET	34		8071	4062	678	629	13001	571	1480	883	360	35	3411	29770	13563.10	POST-TEST
MDOP	870405	SUN		AET	35		8538	3921	728	615	13337	508	1577	1018	373	39	3274	30704	13935.35	POST-TEST
MDOP	870412	SUN		AET	36		8825	3832	758	649	14075	536	1556	906	371	38	3726	31546	14343.34	POST-TEST
MDOP	870419	SUN		AET	37		8505	3893	474	351	12998	448	1410	1091	450	49	2998	29669	14094.40	POST-TEST
MDOP	870426	SUN		AET	38		8417	3971	787	611	13483	585	1669	881	431	31	3467	30866	14348.80	POST-TEST
MDOP	870503	SUN		AET	39		8609	3970	858	652	13017	650	1670	827	427	38	3336	30718	14601.65	POST-TEST

..... END REPORT .....

TABLE III

Lunt Agent Traffic

.DATE 10 NOV 87 16:22:25 RID 75I 10 NOV 87 DALEY
.3880131 MORSE EXACT FARE TEST,LUNT AGENT TRAFFIC BY:

SRCE. REPT.	WEEK ENDED	DAY.	WIN.	TRIK.	REG INDX.	WEEK. TAG	AGENT. FARE	FULL. W/TR.	FULL. FARE	REDU. W/TR.	REDU. FARE	M/BW. PASS.	EMP/. PRMT.	BTFR. RCVD.	RTTR. RCVD.	STFR. FARE	REDU. STFR.	UNIT. TRAFK.	COMP. SUBTL.	CASH COLLECTD.	COMMENTS
568B	860711	FRI	01	130	-4	3818	2280	374	61	48	1798	39	18	5	0	0		4623	2549.70	PRE-TEST
575B	860718	FRI	01	130	-3	1538	2311	359	57	39	1785	35	15	4	0	0		4605	2591.40	PRE-TEST
582B	860725	FRI	01	130	-2	1329	2370	199	80	26	1773	31	152	43	0	0		4674	2476.30	PRE-TEST
589B	860801	FRI	01	130	-1	1329	2191	293	66	42	1912	51	58	28	0	0		4641	2375.30	PRE-TEST
596B	860808	FRI	01	130	1	1325	2084	291	50	54	1855	84	28	49	0	0		4495	2307.75	TEST
603B	860815	FRI	01	130	2	2453	1793	243	56	30	1555	57	28	27	0	0		3789	1931.55	TEST
610B	860822	FRI	01	130	3	1329	1963	338	51	20	1896	82	35	27	0	0		4412	2182.35	TEST
617B	860829	FRI	01	130	4	3818	2211	325	55	28	1608	47	8	140	0	0		4422	2425.30	TEST
624B	860905	FRI	01	130	5	1329	1733	351	35	64	1350	62	33	42	0	0		3670	2029.10	TEST
631B	860912	FRI	01	130	6	1329	2257	369	91	122	1923	66	36	38	0	0		4902	2572.75	TEST
638B	860919	FRI	01	130	7	1329	2142	325	121	116	2024	59	41	43	0	0		4871	2444.45	TEST
645B	860926	FRI	01	130	8	1329	2249	351	123	111	2015	67	46	36	0	0		4998	2605.55	TEST
652B	861003	FRI	01	130	9	1329	2244	374	129	135	2104	51	40	39	0	0		5116	2613.25	TEST
659B	861010	FRI	01	130	10	1329	2195	311	130	137	2210	58	38	34	0	0		5113	2525.90	TEST
666B	861017	FRI	01	130	11	1329	2003	297	118	117	2198	46	47	35	0	0		4861	2243.20	TEST
673B	861024	FRI	01	130	12	1329	2048	313	116	136	2320	47	35	39	0	0		5054	2376.45	TEST
680B	861031	FRI	01	130	13	1329	2178	336	125	130	2249	39	42	36	0	0		5135	2452.00	TEST
687B	861107	FRI	01	130	14	1329	2155	294	108	117	2127	37	57	39	0	0		4934	2435.00	TEST
694B	861114	FRI	01	130	15	1329	2217	314	104	101	2298	45	52	34	0	0		5165	2476.25	TEST
701B	861121	FRI	01	130	16	1329	2277	319	117	134	2282	42	61	33	0	0		5265	2566.10	TEST
708B	861128	FRI	01	130	17	6648	1508	266	71	80	1424	30	26	32	0	0		3437	1780.65	TEST
715B	861205	FRI	01	130	18	1329	2425	341	115	115	2035	49	24	30	0	0		5134	2723.90	TEST
722B	861212	FRI	01	130	19	1329	2283	297	106	130	2007	42	54	36	0	0		4955	2560.90	TEST
729B	861219	FRI	01	130	20	9180	1988	320	103	103	1982	50	35	32	0	0		4613	2309.85	TEST
736B	861226	FRI	01	130	21	1329	1154	197	28	15	1050	34	31	29	0	0		2538	1330.90	TEST
12B	870102	FRI	01	130	22	1329	1331	205	31	15	1096	32	47	17	0	0		2774	1509.90	TEST
19B	870109	FRI	01	130	23	1329	2181	312	143	120	2085	47	57	20	0	0		4965	2517.80	TEST
26B	870116	FRI	01	130	24	1329	2345	357	88	117	2153	60	52	37	0	0		5209	2624.30	TEST
33B	870123	FRI	01	130	25	1329	2129	313	78	89	2017	52	54	40	0	0		4772	2361.20	TEST
40B	870130	FRI	01	130	26	2774	2296	345	81	111	2083	58	40	38	0	0		5052	2487.35	TEST
47B	870206	FRI	01	130	27	1329	2299	342	91	122	2164	54	45	41	0	0		5158	2594.70	TEST
54B	870213	FRI	01	130	28	1329	2138	339	85	87	2222	67	61	53	0	0		5052	2375.25	TEST
61B	870220	FRI	01	130	29	1329	1984	315	77	94	2105	64	49	48	0	0		4736	2202.80	TEST
.68B	870227	FRI	01	130	30	1329	2115	335	95	112	2102	71	59	46	0	0		4935	2388.90	TEST
75B	870306	FRI	01	130	31	1329	2159	340	85	104	2141	82	57	47	0	0		5015	2371.90	TEST
82B	870313	FRI	01	130	32	1329	2062	340	66	138	2192	83	75	56	0	0		5012	2356.05	TEST
89B	870320	FRI	01	130	33	11409	2045	310	84	116	2182	81	54	28	0	0		4900	2314.10	TEST
96B	870327	FRI	01	130	34	1329	2022	362	85	123	2210	82	50	55	0	0		4989	2376.05	POST-TEST
103B	870403	FRI	01	130	35	1329	2098	341	92	135	2090	65	69	50	0	0		4940	2389.05	POST-TEST
110B	870410	FRI	01	130	36	1329	1987	296	94	127	2168	63	57	57	0	0		4849	2275.95	POST-TEST
117B	870417	FRI	01	130	37	1329	1843	279	54	45	2027	60	50	52	0	0		4410	2057.00	POST-TEST
124B	870424	FRI	01	130	38	1329	1964	341	93	79	2176	75	59	60	0	0		4847	2289.85	POST-TEST
131B	870501	FRI	01	130	39	1329	1959	387	84	143	2097	45	64	44	0	0		4823	2367.10	POST-TEST

..... END REPORT .....

TABLE IV

Combined Morse/Lunt Entering Traffic

.DATE 11 NOV 87 08:04:56 RID 76I 11 NOV 87 DALEY
.0860131 MORSE EXACT FARE TEST,MORSE/LUNT AGENT AND TURNSTILE TRAFFIC BY:

*SRCE.	WEEK .		.REG	.WEEK.	AGENT.	FULL.	FULL.	REDU.	REDU.	M/BW.	EMP/.	BTFR.	RTTR.	STFR.	REDU.	. COMP.	. CASH .	
*SEPT.	ENDED	.DAY.	WIN.	TRIK.	INDX.	TAG .	FARE.	W/TR.	FARE.	W/TR.	PASS.	PRMT.	RCVD.	RCVD.	FARE.	STFR.	.SUBTL.	.COLLECTD.	COMMENTS
FREV	860713	SUN		AET	-4	(EST)	10949	4515	584	465	13654	487	1935	1016	592	71	34268	17803.65	PRE-TEST
FREV	860720	SUN		AET	-3	(EST)	11545	4773	648	461	13900	504	1750	826	509	48	34964	18471.80	PRE-TEST
FREV	860727	SUN		AET	-2	(EST)	11915	4495	774	438	13451	541	2103	996	557	49	35319	18640.15	PRE-TEST
FREV	860803	SUN		AET	-1	(EST)	10556	4115	571	413	12322	613	1735	888	383	40	31636	16216.05	TRANSITION
FREV	860810	SUN		AET	1	(EST)	12248	4224	634	591	13028	1141	1770	919	472	49	35076	17601.05	TEST
FREV	860817	SUN		AET	2	(EST)	11646	4435	585	422	12911	955	1683	919	421	47	34463	18020.80	TEST
FREV	860824	SUN		AET	3	(EST)	11755	4488	542	314	13295	895	1652	878	389	39	34247	17976.85	TEST
FREV	860831	SUN		AET	4	(EST)	11601	4657	470	327	12489	759	1639	961	459	235	33597	18139.65	TEST
FREV	860907	SUN		AET	5	(EST)	10426	4403	557	469	12207	658	1467	1312	710	80	32289	17335.80	TEST
FREV	860914	SUN		AET	6	(EST)	11300	4556	846	773	14186	735	1730	907	410	47	35490	18309.00	TEST
MDOP	860921	SUN		AET	7		10310	4352	898	767	14262	664	1711	918	361	25	34268	17059.40	TEST
MDOP	860928	SUN		AET	8		11103	4474	904	768	14165	760	1755	816	331	32	35108	17871.65	TEST
MDOP	861005	SUN		AET	9		11671	4336	893	848	14619	679	1722	871	394	31	36064	18553.05	TEST
MDOP	861012	SUN		AET	10		11156	4425	983	835	15453	686	1659	805	343	33	36378	17994.50	TEST
MDOP	861019	SUN		AET	11		10716	4081	840	709	15241	646	1551	783	407	42	35016	17189.45	TEST
MDOP	861026	SUN		AET	12		10450	4205	937	797	14987	618	1549	863	398	42	34846	16607.55	TEST
MDOP	861102	SUN		AET	13		11750	4506	946	793	15198	619	1672	934	409	35	36862	18597.55	TEST
MDOP	861109	SUN		AET	14		11497	4343	935	751	14868	636	1668	807	354	32	35891	18217.50	TEST
MDOP	861116	SUN		AET	15		10808	4187	806	693	15237	626	1570	808	409	30	35174	17399.75	TEST
MDOP	861123	SUN		AET	16		11023	4181	934	804	15663	804	1676	785	350	37	36257	17545.60	TEST
MDOP	861130	SUN		AET	17		9095	3792	641	566	12542	524	1315	983	698	61	30217	15637.25	TEST
MDOP	861207	SUN		AET	18		12144	4543	896	831	13863	725	1846	708	340	32	35928	19133.75	TEST
MDOP	861214	SUN		AET	19		11061	4322	853	795	14507	689	1679	823	377	35	35141	17864.85	TEST
MDOP	861221	SUN		AET	20		11385	4443	922	853	14276	684	1704	528	415	36	35246	18488.00	TEST
MDOP	861228	SUN		AET	21		8543	3764	373	274	10309	552	1132	971	608	51	26577	14540.65	TEST
MDOP	870104	SUN		AET	22		8762	3779	335	287	10141	575	1189	1325	507	47	26524	12852.40	TEST
MDOP	870111	SUN		AET	23		11546	4639	857	849	13685	678	1731	672	364	36	35057	18667.45	TEST
MDOP	870118	SUN		AET	24		11895	4581	862	774	14589	636	1808	829	345	23	36342	18847.65	TEST
MDOP	870125	SUN		AET	25		10975	4145	735	618	13745	603	1592	903	310	27	33653	17708.15	TEST
MDOP	870201	SUN		AET	26		11943	4389	868	683	14570	681	1706	849	337	32	36058	18277.20	TEST
MDOP	870208	SUN		AET	27		11608	4403	865	799	14443	673	1757	738	362	28	35676	18209.10	TEST
MDOP	870215	SUN		AET	28		11351	4336	799	724	14796	647	1684	850	319	25	35531	17859.00	TEST
MDOP	870222	SUN		AET	29		10771	4086	719	650	14701	672	1593	878	366	37	34473	17035.75	TEST
MDOP	870301	SUN		AET	30		10438	4138	782	786	14711	647	1756	888	340	27	34513	16629.85	TEST
MDOP	870308	SUN		AET	31		11456	4412	812	717	15288	793	1795	1015	385	46	36719	18278.60	TEST
MDOP	870315	SUN		AET	32		10259	3941	768	678	14867	762	1667	812	338	33	34125	16382.20	TEST
MDOP	870322	SUN		AET	33		10354	3951	753	700	15217	767	1506	873	409	38	34568	16452.00	POST-TEST
MDOP	870329	SUN		AET	34		10093	4424	763	752	15211	653	1530	938	360	35	34759	15939.15	POST-TEST
MDOP	870405	SUN		AET	35		10686	4262	820	750	15427	573	1646	1068	373	39	35644	16324.40	POST-TEST
MDOP	870412	SUN		AET	36		10812	4128	852	776	16243	599	1613	963	371	38	36395	16619.29	POST-TEST
MDOP	870419	SUN		AET	37		10348	4172	528	396	15025	508	1460	1143	450	49	34079	16151.40	POST-TEST
MDOP	870426	SUN		AET	38		10381	4312	880	690	15659	660	1728	941	431	31	35713	16638.65	POST-TEST
MDOP	870503	SUN		AET	39		10568	4357	942	795	15114	695	1734	871	427	38	35541	16968.75	POST-TEST

..... END REPORT .....

Appendix 'B' Agent Fare Collection System

I. General Description

A. Agent's Duties

A typical agent's trick begins with reporting in, and signing for and receiving a bank of change. Each bank is sized according to the requirements of the station it is to serve, and is to be restored to its standard composition out of receipts (if possible) by the end of the agent's trick. Each cash fare accepted is to be accounted for by registering the payment transaction on a non-resettable counting device or backup manual tally sheet, according to specified procedures. By the end of the trick, the agent must count and add all money, tokens, and vouchers received; reconcile the total with the amount corresponding to all money fares registered; sort, stock and band the bills, and seal them in a currency envelope; and bag the coins.

B. Security Provisions

The CTA's current system for having agents make change, accept fare payments, and admit passengers to rapid transit service has evolved only slightly since it was established by predecessor companies about 100 years ago. It is based on following overlapping sets of procedures for accepting and handling fare revenues. The procedures are designed to minimize opportunities for diverting fare monies, once they have been received.

To reduce the Authority's exposure to possible revenue loss due to robbery, agents are instructed to keep excess revenues out of public view as much as possible. They are required to make a partial turn-in when receipts accumulate to $50.00, except when doing so would interfere with attending to passengers, as during rush hours. For the final turn-in for the trick, the agent's report, tally sheets (if any), and sorted and counted fare revenues are placed together in a fabric revenue bag which is locked with a serialized plastic seal. Sealed revenue bags are turned in at the agent's operating terminal or deposited in the station drop safe for secure storage until they are picked up by foot collectors. Foot collectors are pairs of armed guards who collect locked revenue bags from station drop safes and transport them to operating terminals in closed steel cars (portable drop safes). Fifty foot collectors using 13 carts collect filled revenue bags and distribute empty revenue bags daily between rail terminals and stations. Filled

revenue bags are transported sealed from the terminals to CTA Central Counting, where they are unlocked and their turn-in totals verified.

So as to be able to trace rapid transit revenues between the agents and Central Counting, each time agent revenue bags are transferred to the control of another person, a receipt is given, which lists the seal number and the cash amount reported by the agent for each bag. This procedure is initiated when foot collectors open an agent booth drop safe, with an agent present, and transfer all revenue bags to their cart (portable drop safe). It is repeated when foot collectors transfer the contents of their carts to a terminal clerk for secure storage in the terminal safe, again when the stored bags are picked up an armored truck team for transport to Central Counting and again when the bags are finally turned over to Central Counting. Each time, care is taken to be sure that the number of bags and the total amount of cash reported are consistent with the numbers receipted in the previous transfer. More than 1,300 revenue bags must be collected, examined, tracked, and distributed daily.

C. Inherent Weaknesses

Over time, incremental refinements have been added, such as agent-controlled turnstiles coupled with registering devices that accommodate non-cash as well as cash fares, so as to tighten entry control and virtually eliminate non-registration of fares. Nevertheless, the improvements in agent equipment made to date and the establishment of cumbersome accounting and security procedures have not corrected the following basic problem conditions that render the system vulnerable to abuse:

1. Though correct registration of fares is the key audit control for transit revenues, fares can be registered incorrectly, either by mistake (which all agents occasionally do), or intentionally (which some agents are believed to do systematically). With agents handling money, inadvertently registering a transfer or a pass as a cash fare creates a shortage, which an agent may be required to make good, however unjustly. On the other hand, registering a cash fare as a lower value fare or as a non-cash entry creates a cash surplus. Despite a procedural requirement to report and turn in any surplus

money, an agent electing to not do so may not be detected.

2. Though incorrect fare registration cannot be identified except by watching agents work, it is usual for an agent to work alone much of the time. Since agents are not monitored continuously, opportunities for mis-registering fares undetected present themselves from time to time. Such opportunities enable an "honest" agent to offset an earlier inadvertent mis-registration or a "dishonest" agent to create a surplus.

3. Security of agent revenues depends on tracking each revenue bag from pickup to Central Counting and reconciling its contents with the Agent's Report. These processes are subject to errors, due to multiple transfers of the bags, the high volume of bags processed each day at Central Counting, and delays in the processing of Agent Reports. The reports are also vulnerable to manipulation during processing, to disguise diversion as error or agent theft.

D. Potential for Revenue Loss

The conditions given in 'C' above make possible abuses that deprive the Authority of revenue, as follows:

1. Passengers are admitted improperly without paying a fare, or paying less than the proper fare. Passenger collusion is usually involved.

2. Fare payments are diverted to benefit an agent. No one but the agent may be aware that anything improper is occurring.

3. Agent revenues are pilfered from revenue bags enroute to Central Counting or at Central Counting.

II. Revenue Logistics

Apart from the difficulties of forestalling theft of fares by agents, other problems relating to the handling of money have been developing. Over the past thirty years, CTA full fares have risen from 25¢ to 90¢ bus/$1.00 rail and transfers from free on request to 25¢, so that passengers have needed more and more coins to pay fares. As a result,

not only has the value of currency handled and counted by agents been increasing, but the weight and bulk of fare revenues to be stored and transported securely each day been growing correspondingly. Due to limitations on the size and weight of portable drop safes that can be handled by Foot Collectors, the increasing weight of agents' receipts has meant that money pickups from fewer and fewer stations can be made before the safes must be taken to a terminal office and emptied.

As the rapid transit fare has approached and reached $1.00, the dominant transport factor for agent revenues has shifted from heavy weight of coins to increasing bulk of currency bills. The feasible length of Foot Collector circuits is now more dependent on the volume of the portable drop safes, rather than the weight of money the Collectors can be required to handle. To compensate for shortened revenue pickup circuits, increases in Foot Collector man hours have been required.

III. Increasing Agent's Work Load

During the same span of time, passenger revenues accepted by machine have dwindled, as awkward fare amounts rendered the use of automatic turnstiles less and less convenient for most passengers. The earlier, all-mechanical turnstiles, which performed admirably for token and one or two-coin fares, could accept only certain combinations of coins. Though able to accept full-fare tokens and all common U.S. coins, the fewer modern electronically-controlled automatic turnstiles now in use have not performed reliably enough to persuade most cash riders to use them regularly. Thus, the proportion of cash passengers entering rapid transit stations who are processed by agents has been growing and the proportion of those processed by machine has been diminishing, as fares have increased.

In recent years, agent's work has also grown in complexity, with the establishment of new fare classes and the introduction of several kinds of monthly and bimonthly passes. At the time the CTA was created, and for several years following, only full and reduced cash fares were registered, whether paid for in currency or token. After a charge for transfers was instituted in 1961, transfer sales were accounted for through the serial numbers of the transfer receipts. Today, agents register up to ten fare classes on weekdays and Saturdays, and up to twelve on Sundays and holidays. Nevertheless, so as not to exceed the number of counters in the current agents' registering devices, a few non-cash fare classes must be lumped together, despite the usefulness of maintaining separate counts. One rider category, young children permitted to ride free, is not registered or counted at all, causing passenger traffic totals (upon which Federal operating

assistance is based) to be understated. Registering this fare class to eliminate a source of subsidy loss, without also eliminating one or more existing fare classes, would further complicate agents' work.

IV. Accounting

Agent reports are processed initially at the CTA Central Counting Facility, where each revenue bag is unlocked and the money is recounted to verify that the amount is the same as reported by the agent. Discrepancies are resolved according to CTA policies and procedures. About one working day is required for processing by Central Counting.

After being released by Central Counting, agent reports are transferred to the Revenue Accounting Section, where they are immediately sorted by reporting date (as much as possible), line, station, and window code. Obvious errors, such as the wrong reporting date, are corrected as they are recognized, and the sorted reports are assembled into batches for data entry. One and one-half to three weeks usually elapse before the agent report data can be manually entered into the accounting computer.

The computer checks for continuity of register totals between successive agents using the same register unit, and calculates traffic in all fare classes registered or otherwise tallied and reported, but does not sort agent reports into correct order. A summary report of all agent activity is prepared for each date, and stored in the computer for reference and analysis.

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